

Title (en)  
CLEANING SYSTEM AND METHOD FOR OPERATING THE CLEANING SYSTEM

Title (de)  
REINIGUNGSSYSTEM UND VERFAHREN ZUM BETRIEB DES REINIGUNGSSYSTEMS

Title (fr)  
SYSTÈME DE NETTOYAGE ET PROCÉDÉ POUR FAIRE FONCTIONNER LEDIT SYSTÈME

Publication  
**EP 3510961 A1 20190717 (EN)**

Application  
**EP 19156022 A 20150803**

Priority  
• EP 19156022 A 20150803  
• EP 15002308 A 20150803

Abstract (en)  
The invention relates to a cleaning system being configured for cleaning, including fragmentation, debridement, material removal, irrigation, disinfection and decontamination, of cavities (2) filled with a liquid (3). The cleaning system comprises an electromagnetic radiation system and the liquid (3). A treatment handpiece (7) and its exit component (8) are configured to irradiate the liquid (3) within the cavity (2) with the radiation beam, wherein a wavelength of the radiation beam is chosen for significant absorption of the radiation beam in the liquid (3). The electromagnetic radiation system is adapted to generate a first vapor bubble (18) within the liquid (3) by means of a corresponding first pulse (p) and a second vapor bubble (18') within the liquid (3) by means of a corresponding second pulse (p) at a location different to the location where the first vapor bubble (18) is present at the time of generating the second vapor bubble (18'). The electromagnetic radiation system further comprises a feedback system (9) to determine a bubble oscillation intensity. Adjusting means (10) are provided for adjusting the pulse repetition time (Tp) as a function of the determined bubble oscillation intensity. The pulse repetition time (T) is adjusted such, that the onset time (t) of the second vapor bubble (18') is within the first contraction phase of the first vapor bubble (18), when the first vapor bubble (18) has contracted from its maximal Volume (V) to a size in a range from about 0.7 to about 0.1 of the maximal Volume (V).

IPC 8 full level  
**A61B 18/26** (2006.01); **A61L 2/00** (2006.01); **B23K 26/122** (2014.01)

CPC (source: EP US)  
**A61B 18/26** (2013.01 - EP US); **A61C 1/0046** (2013.01 - EP US); **A61C 5/40** (2017.02 - EP US); **A61C 17/0202** (2013.01 - EP US); **A61L 2/0029** (2013.01 - EP US); **B08B 3/102** (2013.01 - US); **B08B 7/02** (2013.01 - US); **A61B 2017/00176** (2013.01 - EP US); **A61B 2017/00194** (2013.01 - EP US); **A61B 2018/00404** (2013.01 - US); **A61B 2018/00505** (2013.01 - US); **A61B 2018/263** (2013.01 - EP US); **A61L 2202/11** (2013.01 - EP US); **A61L 2202/17** (2013.01 - US)

Citation (applicant)  
• WO 9916366 A1 19990408 - UNIV CALIFORNIA [US]  
• WO 2013049832 A2 20130404 - BIOLASE INC [US]  
• WO 2008149352 A2 20081211 - PIXER TECHNOLOGY LTD [IL], et al  
• US 2004020905 A1 20040205 - SONG WENDONG [SG], et al

Citation (search report)  
• [XY] WO 9916366 A1 19990408 - UNIV CALIFORNIA [US]  
• [Y] US 2009220908 A1 20090903 - DIVITO ENRICO [US], et al  
• [E] EP 2907471 A1 20150819 - FOTONA D D [SI]  
• [A] WO 2013049832 A2 20130404 - BIOLASE INC [US]  
• [A] WO 2008149352 A2 20081211 - PIXER TECHNOLOGY LTD [IL], et al  
• [A] US 2004020905 A1 20040205 - SONG WENDONG [SG], et al  
• [A] WO 2013169181 A1 20131114 - BIOLIGHT PATENT HOLDING AB [SE]  
• [A] US 5116227 A 19920526 - LEVY GUY [US]  
• [A] US 2003136756 A1 20030724 - LECLAIR MARK L [US]

Designated contracting state (EPC)  
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

DOCDB simple family (publication)  
**EP 3127502 A1 20170208**; **EP 3127502 B1 20190320**; EP 3510961 A1 20190717; EP 3510961 B1 20210609; PL 3127502 T3 20190930; US 10518299 B2 20191231; US 11964311 B2 20240423; US 2017036253 A1 20170209; US 2020086362 A1 20200319

DOCDB simple family (application)  
**EP 15002308 A 20150803**; EP 19156022 A 20150803; PL 15002308 T 20150803; US 201615227068 A 20160803; US 201916691754 A 20191122